

REMARKS

Reconsideration of this application is respectfully requested.

I Status of the Claims

Claims 3-7 are pending in the application.

Claims 3-7 have been rejected.

Claims 3 and 4 have been amended with no new matter added.

II Rejections Under 35 U.S.C. § 112

The Examiner has rejected claims 3-7 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

Applicants respectfully submit that the present specification currently enables the claims to an L10 life ratio greater than or equal to 3. The present specification states that the test pieces representing the present invention have been treated according to the manner of the present invention (Table 1). Thus, Applicants submit that the examples in the present specification are representative of the typical performance of the present invention under the specified experimental conditions. In the prior art cited by the Examiner (Maeda et al., U.S. Patent No. 6,158,263), several examples with 30% or greater retained austenite exhibit L10 life ratios greater than or equal to 3 as well as exceptions including those offered as Comparative Examples #1-8 in Table 1 of Maeda. Thus, the addition of retained austenite, under the proper circumstances, can produce L10 life ratios greater than 3. The current invention clearly discloses that a range of austenite between 30 and 80% can exhibit the claimed properties. Applicants submit that, in light

of the aforementioned, the 35 U.S.C. § 112, first paragraph, objection should be withdrawn.

The Examiner has rejected claims 3-7 under 35 U.S.C. § 112, second paragraph, as being indefinite.

Applicants have amended claims 3 and 4 to correct the antecedent basis, typographical errors, and confusion regarding the terms “bearing structure” and “bearing part.” Claim 3 has been amended to recite “carbonitriding the surface of said bearing to produce an amount of retained austenite in a surface layer that is increased by about 30% from austenite concentration prior to the step of carbonitriding” to clarify the definite amount of the stated 30% increase. Applicant has also clarified claim 3 by describing a distinct “rolling raceway surface” and “roller bearing” which form a “bearing structure” in combination. Claim 4 has been amended to remove uncertainty regarding the word “forming.”

In view of the foregoing, Applicants respectfully request the Examiner withdraw these rejections to the claims.

III Rejection Under 35 U.S.C. § 103

Claim 3-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicant’s Admitted Prior Art (AAPA) over U.S. Patent No. 5,658,082 to Tsushima et al. (Tsushima) and U.S. Patent No. 6,158,263 to Maeda et al. (Maeda).

The Examiner contends that AAPA teaches a method for making long life cylindrical or needle roller bearings by increasing retained austenite content in the part by about 30%, heat treating the surface, and implementing surface machining to form micro

concavo-convex portions in random directions. AAPA fails to teach a step of carbonitriding the part.

Tsushima teaches carbonitriding a rolling bearing to extend its service life to reach a retained austenite layer from 20-40%. The Examiner notes that certain of Tsushima's examples, specifically Steel C listed in Table 2 with 25% retained austenite, fail to exhibit L10 life ratios greater than or equal to 3. The Examiner also finds fluctuations in L10 life ratio values as the amount of retained austenite is increased in Table 1 of Maeda.

Applicants respectfully traverse the above rejection. Applicants submit one of ordinary skill in the art is not taught or motivated to combine the AAPA with Tsushima and Maeda. Tsushima teaches away from the teachings of the AAPA. Tsushima states that indentations, such as those micro concavo-convex portions in the present invention and the AAPA, cause "the spalling of the raceway ... and the rolling fatigue life of the bearing is shortened" (Tsushima, column 1, lines 16-18). Further, Tsushima teaches that wear resistance of the part would be lowered to an undesirable level if the amount of retained austenite exceeds 40% (*See* Tsushima, column 4, lines 27-30). In this manner Tsushima teaches away from combination with the AAPA, which teaches both amounts of retained austenite much greater than 40% and the creation of micro concavo-convex indentations.

Maeda similarly teaches away from combination with the AAPA. Maeda states that preventing surface wear on the rolling elements is integral for increasing part fatigue life (*See* Maeda, column 1, lines 49-55). Specifically, Maeda cites the problem of surface peeling on the rollers. One of ordinary skill in the art would recognize that the micro

concavo-convex indentations mandated in the AAPA would provide local stress concentrations which serve as convenient starting points for material to peel off the surface. Thus, one of ordinary skill in the art is not motivated to combine Maeda with the AAPA since implementing the AAPA's micro-indentation suggestion would undesirably reduce the fatigue strength of the resulting part.

Thus, the Examiner has not presented a *prima facie* case of obviousness. One of ordinary skill in the art would not be taught or motivated to combine either Maeda or Tsushima with the AAPA because the prior art teaches that micro indentations would reduce the lifetime of the surface of a part, such as carburizing or carbonitriding. The present invention makes the unique combination of carbonitriding for increased retained austenite and micro concavo-convex indentations to form a bearing structure with an increased L10 life ratio. Thus, Applicants respectfully request that the above rejection be withdrawn.

CONCLUSION

In view of the above amendments and remarks, it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved by either a Supplemental Response or a Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

By 

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